Draw the Molecular Orbital Energy level diagram for N₂

- Large 2s-2px interaction

- Electron Configuration:

  \[ \sigma_{1s}^2 \sigma_{2s}^2 \sigma_{2p}^2 \pi_{2p_x}^2 \pi_{2p_y}^2 \]

- Bond Order:

  \[ BO = \frac{1}{2} (10e^- - 4e) = 3 \]

- Number of unpaired electrons and magnetic properties:

  \( \uparrow \uparrow \) dia magnetic

- Bond Length: short

- Bond Dissociation Energy: high

- Bond Strength: high
Problems:

1. Which has the Highest Bond Energy? Why?
   - a. $\text{B}_2$ or $\text{B}_2^{2+}$
     \[ \text{Bo} = 1 \]
   - b. $\text{C}_2$ or $\text{C}_2^{-2}$
     \[ \text{Bo} = 2 \]
   Bond Energy $\propto$ Bond order

2. Which has the Shortest Bond Length? Why?
   No bond!
   - a. $\text{Ne}_2$ or $\text{Ne}_2^{-2}$
     \[ \text{Bo} = 0 \]
     Bond length $\propto \frac{1}{\text{Bond order}}$
   - b. $\text{F}_2$ or $\text{F}_2^{-1}$
     \[ \text{Bo} = 1 \]
     Bond length $\propto \frac{1}{\text{Bond order}}$

3. Which has the Lowest Bond Dissociation Energy? Why?
   - a. $\text{C}_2$ or $\text{C}_2^{-2}$
     \[ \text{Bo} = 2 \]
   Bond Dissociation $\propto$ Bond order
   - b. $\text{C}_2^{-2}$
     Bond Dissociation $\propto$ Bond order
   Bond Energy